UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAY 15 2009

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Model Clearinghouse Review of CALPUFF Modeling Protocol for BART

FROM: Tyler Fox, Leader
Air Quality Modeling Group (C439-01)

TO: Kevin Golden, Lead Regional Modeler
Air Permitting, Monitoring, and Modeling Unit (8P-A)

Carl Daly, Chief
Air Permitting, Monitoring, and Modeling Unit (8P-A)

INTRODUCTION

In response to your memorandum of February 24, 2009, the Model Clearinghouse has reviewed the proposed position and resolution of the issues presented in order to develop a suitable air quality analysis for visibility for the Otter Tail Power Big Stone Unit I located in Eastern South Dakota. The purpose of this analysis is to determine if this source is subject to Best Available Retrofit Technology (BART) requirements under EPA's Region Haze Program regulations.

Guidelines for determining how to identify sources "subject to BART" are provided in section III of EPA's *Guidelines for BART Determination Under the Regional Haze Rule*, which is located in Appendix Y to Part 51 of Title 40 of the Code of Federal Regulations. Section III.A.3.(Option 1) of Appendix Y, allows the use of CALPUFF model to predict the visibility impacts from a single source at a Class I area and states that CALPUFF is the best regulatory model currently available for this application. Furthermore, with respect to the use of CALPUFF for regulatory applications, footnote 8 in this section of Appendix Y references EPA's *Guideline on Air Quality Models (GAQM)*, published in Appendix W of Part 51. Section 6 of the *GAQM* includes recommendations regarding application of CALPUFF for visibility assessments and for long range transport (LRT) applications in general (nominally beyond about 50 kilometers), indicating that such applications "will require significant consultation with the appropriate reviewing authority (paragraph 3.0(b) [of Appendix W]) and the affected FLM(s) [Federal Land Managers]". Appendix Y also recommends developing a modeling protocol and following the guidance contained within the *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (USEPA, 1998). The IWAQM Phase 2 summary report is also referenced by the *GAQM*. Thus, when CALPUFF is used in this context, it is our understanding that EPA Regional Offices have

encouraged following both the IWAQM Phase 2 report and the *GAQM* when conducting modeling for the BART program.

Recently the FLMs have made us aware that a number of the issues identified in the Region's memorandum regarding this BART application also exist for Prevention of Significant Deterioration (PSD) modeling conducted for assessing impacts in mandatory Class I areas. While Appendix Y and the *GAQM* both offer some flexibility in models and procedures for visibility assessments, deviations from the use of preferred models or modifications of preferred models under PSD is discussed in Section 3 of the *GAQM* and requires Regional Office approval in all cases. See also, 40 C.F.R. § 51.166(l)(2). Given the importance of the issues that the Region has identified and their similarity to issues identified by the FLMs in recent PSD applications, the Model Clearinghouse believes it appropriate to evaluate the protocol proposed by Otter Tail power for its scientific merit.

The Model Clearinghouse review has focused upon the primary issues identified in the Region's memorandum, but also identified several other issues that the Region may wish to consider in its ongoing negotiations. In summary,

1) We concur with Region 8's position that the use of a 1 km grid resolution in CALMET/CALPUFF is not adequately justified given the geographical characteristics of the domain of interest and the limitations of the modeling system.

2) We concur with Region 8's view based on EPA guidelines that "blending" National Weather Service (NWS) observations with prognostic model data is the most technically-sound approach to developing meteorological fields for application of the CALPUFF model when prognostic model data are incorporated. This approach should be used unless adequate documentation is provided demonstrating that an alternative approach has equal technical merit. Absent pertinent evaluations, we are unable to endorse use of the NOOBS =1 option recommended in the *Otter Tail Protocol* at this time

3) We defer the decision on the appropriateness of the proposed concentration post-processing procedures to the Regional Office and the FLMs.

In addition, we are proposing revisions to the IWAQM Phase 2 recommendations that are responsive to the issues and concerns raised in this memorandum. A more complete discussion is provided in the draft document *Reassessment of the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report: Revisions to Phase 2 Recommendations* (USEPA, 2009) available for review on EPA's Support Center for Regulatory Atmospheric Modeling (SCRAM) website.

The remainder of this memorandum provides background on the Region 8 request and a more detailed explanation for each of the above recommendations.

BACKGROUND

EPA Region 8, in conjunction the US Fish and Wildlife Service, National Park Service, and the state of South Dakota, has worked to develop an adequate CALPUFF modeling protocol for the Best Available Retrofit Technology (BART) analysis for the Otter Tail Power Big Stone Unit I electrical generating unit in eastern South Dakota. Big Stone Unit I is a large uncontrolled coal-fired facility that is approximately 400 km from the nearest Class I areas in Minnesota and South Dakota.

The facility's consultant completed a CALPUFF modeling analysis in September 2008. This analysis was conducted in the absence of a protocol approved by the aforementioned parties. In this submittal, the Big Stone Unit I had an impact of 0.489 delta-deciview (d-dv) on the Boundary Waters (BOWA) Class I area. Other modeling of this facility produced vastly different results, raising concerns that the methods used in the September 2008 analysis may have resulted in the lower modeled impacts. For example, CAMx source apportionment modeling conducted in 2007 by EPA Region 7 on the Big Stone Unit I yielded a maximum change of 1.87 d-dv at BOWA, with ten days exceeding a 0.5 d-dv change.

In January 2009, the facility's consultant submitted the *Otter Tail Protocol* (TRC, 2009) to EPA Region 8 and the FLMs outlining proposed procedures for a revised CALPUFF analysis. The *Otter Tail Protocol* proposed specific changes to the Western Regional Air Partnership (WRAP) BART modeling protocol (WRAP, 2006) including grid resolution, radius of influence values for CALMET, and the CALMET NOOBS options that are not EPA-approved. Additionally, the *Otter Tail Protocol* proposed the use of alternative procedures for post-processing nitrate concentrations that are not consistent with the WRAP BART modeling procedures. Both EPA Region 8 and the FLMs objected to the proposed deviations, but subsequent negotiations with the facility have not yielded any changes to the proposed *Otter Tail Protocol.*

In February 2009 EPA Region 8 referred the *Otter Tail Protocol* to the EPA Model Clearinghouse for review of the Region's position on grid resolution, non-default CALMET options, and CALPUFF post-processing options. This Clearinghouse memorandum will address the specific deviations from the WRAP protocol identified by the Region's Modeling Clearinghouse request.

CALMET/CALPUFF GRID RESOLUTION

The *Otter Tail Protocol* called for the use of three separate CALMET/CALPUFF modeling domains covering mandatory Class I areas in South Dakota, North Dakota, and Minnesota, "[O]wing to the high spatial resolution and the large extent of the area of interest". Each of the proposed modeling domains utilize a horizontal grid resolution of 1 kilometer, deviating from the 4 km horizontal grid resolution recommended by the WRAP protocol. The *Otter Tail Protocol* specifically states that the

> "...complex terrain is best resolved with a 1 km grid. Additionally, the coastline of Lake Superior, close to Boundary Water Canoe Area WA, and of other smaller lakes on the trajectories to the various Class I areas, is also best resolved at 1km resolution."

An argument for the use of finer resolution CALMET wind fields should address two components. The first is that the prognostic meteorological data sets from NWP models lack sufficient resolution to capture meteorological features of interest which would be responsible for transport of airborne contaminants from the source to the Class I area(s) of interest. The second component of the argument is that the diagnostic wind model (DWM), CALMET, can enhance the NWP data used as the first-guess wind field (IPROG=14) sufficiently to adequately replicate the key meteorological features of interest.

Model Clearinghouse Recommendation on Grid Resolution

Based upon a review of the *Otter Tail Protocol* and relevant scientific literature, the Model Clearinghouse offers the following conclusions. First, the *Otter Tail Protocol* presents no scientific evidence to support the claim that 1 km CALMET resolution increases the objective accuracy of the final wind field, especially in areas of relatively modest topographic relief, such as for each of the three domains proposed. The preponderance of scientific literature is consistent in the conclusion that there is a limitation to the benefit of higher resolution gridded meteorological data, whether from NWP or DWM models, especially for areas of modest topographic relief. Higher resolution data does not necessarily improve model performance, but may in fact degrade model performance for some predicted meteorological parameters. Second, CALMET has limited ability to independently capture the full three-dimensional structure of complex flows. Without the benefit of high resolution NWP data or a high density of representative observational data, the ability of the DWM to accurately simulate these conditions is limited. Several studies have documented the inherent limitations of DWM diagnostic algorithms (e.g., Earth Tech, Inc. (2001), Scire (2008), and Scire (2009))

Therefore, we concur with the Region's position that the use of a 1 km grid resolution in CALMET/CALPUFF is not adequately justified given the geographical characteristics of the domain of interest and the limitations of the modeling system. Furthermore, as indicated in our Introduction, the *Otter Tail Protocol* links the limited geographic extent of the three proposed modeling domains to the use of high (1 km) spatial resolution, implying a trade-off in computational resources between grid resolution and spatial coverage. We do not feel that such a trade-off is justified, and are concerned that the proposed domains may not adequately simulate the potential for plume recirculation. Based on a review of the relevant scientific literature and a review of the CALMET capabilities, we also see no evidence to support the use of a 4 km grid resolution for CALMET/CALPUFF in this case, as recommended in the WRAP BART protocol. Note that the WRAP protocol addresses BART evaluations across a wide domain encompassing the most rugged terrain in the U. S., and this assessment regarding the applicability of 4 km grid resolution for the Otter Tail analysis is not intended to suggest that grid resolutions higher than the 36 km MM5 data are not justified for other areas within WRAP.

Based on our review of this issue and given the limitations of the CALMET DWM, our view is that the candidate NWP data used should appropriately characterize the key meteorological features that govern source-receptor relations for the specific application. We also see no clear basis for, or benefit from, extending the CALMET/CALPUFF grid resolution much beyond the resolution of the prognostic model used to specify the first-guess wind field. Since the Model

Clearinghouse recommendation is to maintain the original horizontal grid resolution of the NWP data in most situations, it would be inappropriate to apply CALMET with any diagnostic adjustments, unless a sufficiently dense and representative network of observed data are available, and the improved performance of the CALMET wind fields can be objectively demonstrated. When properly applied with adequately resolved NWP data, the CALMET first-guess field likely already reflects the relevant meteorological features of interest at that resolution.

The Model Clearinghouse recommendation strictly implies that the candidate NWP data used should appropriately characterize the key meteorological features that govern source-receptor relations for the specific application. This places a higher emphasis on ensuring that the candidate NWP dataset is at the appropriate horizontal grid resolution ***and*** that the dataset captures the key meteorological features for the specific application. Therefore, the recommendation for establishing the suitability of NWP dataset under Section 8.3(d) of the *GAQM* is a critical component for planning a successful LRT model application. In light of these concerns, the appropriateness and adequacy of the CALMET/CALPUFF grid resolution, as well as any prognostic model data used as input to CALMET, should be adequately justified based on the specific needs of the application, and measures should be taken to objectively assess the resulting meteorological fields, including both horizontal and vertical velocity fields, prior to their acceptance for use in CALPUFF. In accordance with Section 8.3(d) of the *GAQM*, we must emphasize that acceptance of a prognostic data set is contingent upon concurrence from the appropriate reviewing authority. Therefore, at a minimum, any protocol should include an evaluation of the performance of the candidate NWP dataset prior to acceptance by the reviewing authority. Model performance evaluation procedures should be based on appropriate and acceptable metrics and methods. Further, if the intent is to apply CALMET at resolutions much higher than the original NWP dataset, the suitability of the resultant datasets should also be examined through the appropriate statistical analysis.

A more complete discussion of this issue is provided in the draft document *Reassessment of the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report: Revisions to Phase 2 Recommendations* (USEPA, 2009) available for review on EPA's Support Center for Regulatory Atmospheric Modeling (SCRAM) website. This draft report also provides a detailed discussion of model evaluation methods and procedures appropriate for these applications, including procedures for evaluation of diagnostic meteorological fields.

CALMET NON-DEFAULT SETTINGS

As background, when the CALPUFF modeling system was promulgated in April 2003 as the preferred model for LRT regulatory applications under the *GAQM*, the "hybrid" approach referred to in Section 8.3 of the *GAQM* (formerly Section 9.3 prior to 2005) called for both NWS surface and upper air data. Shortly after its promulgation, the EPA-approved version of the CALMET/CALPUFF modeling system included new options which eliminated the need for surface and upper air observations, relying totally upon prognostic data as the sole meteorological input into CALMET. This approach is most commonly referred to as the "NOOBS" approach, and is invoked by selecting the NOOBS = 1 or 2 option in CALMET. The *Otter Tail Protocol* specifically recommends the use of the NOOBS = 1 option of CALMET,

which uses NWP data in lieu of twice daily upper air soundings normally employed in the construction of CALMET wind fields, but incorporates surface observations. The NOOBS = 2 option uses no observed surface or upper air data, relying solely on the NWP data. The *Otter Tail Protocol* contends that using upper air observations directly into CALMET is likely to degrade the quality of the wind fields as compared to the use of gridded MM5 data, although no further rationale or objective evidence for this claim is offered.

As discussed in the IWAQM reassessment report (USEPA, 2009), there is a clear body of evidence to suggest that higher spatial and temporal frequency of NWP data used in LRT modeling generally results in better LRT model verification statistics. Therefore, in theory, the NOOBS approach in CALMET could offer the opportunity to take advantage of higher temporally and spatially resolved initial guess wind fields from NWP data than could otherwise be achieved through the exclusive use of twice-daily RAOB soundings. However, it is important to note that CALMET does not merely pass through the majority of the information from the NWP model to CALPUFF. Much of the original NWP data (e.g., planetary boundary layer (PBL) heights and scaling parameters) is recomputed within CALMET. Therefore, careful consideration must be given to how these re-diagnostic procedures are implemented within CALMET. As also noted in the IWAQM reassessment report (USEPA, 2009), CALMET does not fully utilize the 3-dimensional temperature fields when applying diagnostic adjustments to the wind fields under the regulatory default option, although the full temperature field is passed to CALPUFF (along with the vertical velocities) if the LCALGRD option is selected. Aside from the documented limitations of the modeling system to properly utilize the full benefits of current state-of-the-practice prognostic modeling capabilities, there are few, if any, objective evaluations of model performance on which to base acceptance of these NOOBS options.

Model Clearinghouse Recommendation for Non-default CALMET Settings

While the *Otter Tail Protocol* only proposes the use of the NOOBS=1 option of CALMET, our experiences from the assessment of the VISTA's version (USEPA, 2008) and the 2001 Philadelphia study (Anderson, 2006) suggest that careful consideration of the underlying science and its implementation must be taken when using the more advanced features of CALMET. A literature search conducted by the Model Clearinghouse on subsequent evaluations of the CALMET model used in both the traditional "hybrid" approach and the newer "NOOBS" approach yielded no significant information regarding the performance of the "NOOBS" approach as compared to the traditional "hybrid" approach, other than the references listed in Appendix A-4 of the description of the CALPUFF modeling system delineated in the *GAQM*. Given the documented limitations of the modeling system described above, and lacking any relevant evaluations of the NOOBS=1 approach, we would not be able to endorse its use at this time without a thorough inspection of its implementation and evaluation of model performance.

The Model Clearinghouse also concurs with Region 8's view based on existing EPA guidance that "blending" of NWP data with observations is the most technically-sound approach to developing meteorological fields for application of the CALPUFF model. This approach should be used absent information showing that an alternative approach has equal technical merit. Section 8.3.1.2(d) of the *GAQM* states that these mesoscale meteorological fields should be used in conjunction with available standard NWS or comparable meteorological observations within

and near the modeling domain. While the traditional method for this approach has been accomplished through the use of CALMET in its "hybrid" mode, Section 8.3.1.2(d) does not preclude the use of other methods to "blend" observational data into NWP data. It is EPA's view that the use of prognostic data from an NWP model using four-dimensional data assimilation (FDDA) is consistent with this recommendation for "blending". A more complete discussion of this issue is provided in the draft IWAQM reassessment report (USEPA, 2009), including proposed revisions to the IWAQM Phase 2 recommendations that are responsive to the issues and concerns raised in this memorandum. We also anticipate that new guidance and additional regulatory clarifications on the use of NWP and observational data in LRT modeling will be developed in the future as the modeling community expands its use of NWP data in dispersion modeling.

CONCENTRATION POST-PROCESSING ISSUES

The *Otter Tail Protocol* proposes the use of the Ammonia Limiting Method (ALM) which utilizes time-varying background values of sulfate, nitrate, and total ammonia. Monthly background averages are derived from 2002 CMAQ modeling results from the WRAP for each of the Class I areas under review. The *Otter Tail Protocol* contends that the full ALM approach is consistent with the MNITRATE=1 approach that the FLMs have previously accepted in Class I visibility analyses. Both Region 8 and the FLMs object to the use of the full ALM, and would prefer a constant ammonia background and the application of MNITRATE=1.

Under Section 6.2.1(e) of the *GAQM*, CALPUFF may be applied for haze attribution assessments when larger domains are involved than can normally be handled by the VISCREEN model. No specific guidelines exist within the *GAQM*, which covers the application of CALPUFF for the post-processing of chemical species. General guidance on the application of CALPUFF for such analyses can be found in the IWAQM Phase 2 report (USEPA, 1998) and Federal Land Managers FLAG 2000 guidance (NPS, 2000). According to Section 6.2.1(e) of the *GAQM*, specific procedures and analyses for CALPUFF should be determined in consultation with the appropriate reviewing authority and the affected FLMs. Since EPA Region 8 is the reviewing authority of record for this analysis, the Model Clearinghouse defers to the Region's judgment as to the best analytical procedures for post-processing of concentrations for visibility calculations.

ADDITIONAL OBSERVATIONS FOR CONSIDERATION

The Model Clearinghouse would also like to highlight several other observations that the Region should consider in its evaluation of the *Otter Tail Protocol* as it pertains to grid resolution. As noted above, the proposed use of a 1 km grid resolution in CALMET/CALPUFF is linked in the *Otter Tail Protocol* with the specification of three separate modeling domains of limited extent, ostensibly to balance the computational demands of the high resolution grid. The emission unit under review is located at the extreme eastern edge of the proposed modeling domains for both the southwestern and northwestern domains. Since during significant periods of the year the synoptic scale winds will flow zonally from west to east over the high plains of the north central United States, it is reasonable to expect that the emissions from the unit being modeled will rapidly flow off of the computational domain. If recirculation of the emissions is possible, the

proposed grid configuration creates the potential for artificial elimination of emissions from the computational domain. Therefore, we recommend that the Region consider expanding the domains both east and south to prevent the possibility of artificial elimination of emissions from the computational grid. Also, given our response to the issue regarding grid resolution, there does not appear to be any technical or practical issues that would necessitate the use of multiple domains for this application.

The stack parameter information listed in Table 2-1 of the *Otter Tail Protocol* appears inconsistent with stack data reported on the WRAP website and utilized in the 2007 CAMx PSAT analysis previously cited. Region 8 should verify that the information contained in the *Otter Tail Protocol* is correct.

SUMMARY

The Model Clearinghouse has reviewed the BART modeling protocol for the Otter Tail Power Big Stone Unit I in South Dakota and Region 8's positions regarding the proposed CALMET/CALPUFF grid resolution, non-default CALMET settings, and concentration post-processing options. Based upon our review of the supporting information contained within the *Otter Tail Protocol* and available literature regarding the use of NWP data in DWM's, the Model Clearinghouse concurs with Region 8's position on grid resolution and the use of non-default options. We defer the final issue regarding post-processing to the Region and the FLMs for appropriate resolution. If you have any further questions or comments, please contact me at (919) 541-5562.

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MEMORANDUM

SUBJECT: Calpuff Visibility Modeling Protocol for Regulatory Analysis

FROM: Kevin Golden, Lead Regional Modeler

Carl Daly, Chief Air Permitting, Monitoring, and Modeling Unit

TO: Tyler Fox, Leader
Air Quality Modeling Group, OAQPS

This memo seeks your concurrence with Region 8's intent to reject certain aspects of a BART analysis proposed by Otter Tail Power for the Big Stone Unit 1 EGU in eastern South Dakota. The Calmet-related issues with Big Stone have also been raised by commenter's at recent EPA/State/Local modeling workshops and in the technical literature. A long term fix of the interface between Calmet/MM5/Calpuff needs to be developed to provide consistency and accuracy in Calpuff applications. In the interim, EPA guidance is needed on how to address these issues in regulatory applications. In the absence of a refined model evaluation data set that would allow a definitive resolution to these issues, Region 8 is seeking an approach that will provide a reasonably conservative estimate of Big Stone's impact on visibility in Class 1 areas.

BACKGROUND

Region 8 has been working with the Federal Land Managers and South Dakota to develop an acceptable Calpuff modeling demonstration to determine whether the Big Stone Unit 1 power plant in eastern South Dakota is subject-to-BART. Big Stone Unit 1 is a large uncontrolled coal-fired facility that is approximately 400 km from the nearest Class 1 areas in MN. We have attempted to develop a modeling protocol with the company/FLMs/SD, however the company's consultant (Otter Tail Power's consultant is TRC) has not been responsive to Region 8's, SD's, and the FLM's comments. We are concerned about the continuing delay in resolving this issue since the December 2007 regulatory deadline for States to submit Regional Haze SIPs has passed and EPA has issued a finding of failure to submit to SD. In addition, the company has proposed another unit at the Big Stone facility that would rely, in part, on SO2 and NOx emission reductions from the existing Unit 1 to avoid the PSD process for the new unit. There has been considerable interest in the media, at the political level, and in the environmental community on

the Big Stone new unit issue.

Big Stone 1 has previously been modeled for BART visibility impacts by Region 7 as part of work being conducted for Nebraska using the particulate source apportionment (PSAT) capability of CAMx. That "screening" analysis showed impacts exceeding 0.5dv at Class 1 parks in both SD and MN. In addition, TRC applied the Calpuff model in their September 2008 submittal in the absence of an approved protocol. That analysis showed an impact of 0.489 dv on the Boundary Waters Class 1 area.

SPECIFIC ISSUES AND REGION 8 POSITION

Modeling grid

TRC has proposed to use three CALMET modeling domains developed with 1 km resolution and an overlaying 36 km MM5 grid (see Figure 3-1 in TRC attachment). Region 8 has accepted 1 km and smaller grids in modeling applications in Colorado and Montana where complex terrain is in close proximity to the source because we believe that the higher resolution at these distances will better characterize terrain effects and local scale meteorology. However, at a distance of 400 km in relatively flat terrain it does not seem reasonable that, in the absence of additional data, a 1 km resolution would provide a more accurate estimate of source impacts. This is particularly true when the MM5 data is only at a 36 km resolution. We are concerned that the proposed 1 km grid resolution in Calpuff/Calmet will not necessarily enhance and may even degrade model performance. We are not aware of a model evaluation data base that would allow us to test model performance at these distances using various grid resolutions. Region 8 believes that a 4 km resolution in Calmet / Calpuff would likely provide a conservative estimate of impacts in this application.

Calmet Non-default settings

TRC is proposing to use the non-default "no-obs" setting in Calmet, which would make this a non-guideline modeling demonstration. TRC argues that inclusion of the upper air data directly into Calmet is likely to degrade the quality of the wind fields, and that these observations are not dense enough, thus they propose to use model settings noobs=1 and itwprog=2. These switches remove the need for upper air observations both with regard to winds and temperature. TRC's arguments are not supported by data showing degraded wind fields. Appendix W (paragraph 8.3.1.2(d)) requires that mesoscale meteorological fields be used in conjunction with NWS or comparable observations, not in place of such observations. Region 8 believes that upper air observations and temperature profiles should use the default settings. (noobs-0 and itwprog=0).

Ammonia issues

Initially TRC would assume a constant background ammonia concentration of 1 parts per billion (ppb) as recommended in the 2006 WRAP Protocol, However, TRC proposes to use data from a CMAQ 2002 modeling application in the ammonia limiting method (ALM) analysis. This would

result in ammonia concentrations lower than values that have recently been measured in the MN Class 1 areas, and significantly lower than those measured in southwestern MN closer to the location of the Big Stone facility (Caughey, 2008). Region 8 has more confidence in the measured ammonia levels which suggest that a value of at least 1 ppb is appropriate for use in Calpuff and any ammonia limiting analysis.

In their September 2008 submittal TRC utilized a specific version of ammonia limiting (referred to as ALM) during the POSTUTIL step that was specifically developed as part of the VISTAS BART process and was reviewed and rejected by FWS/NPS. VISTAS subsequently did not pursue or incorporate that method further into VISTAS work. In that case, EarthTech (now TRC) was the consultant for VISTAS. However, FWS/NPS has accepted a similar ammonia limiting process through the use of POSTUTIL's "MNITRATE=1" switch. Region 8 proposes to accept this approach, which is consistent with the VISTAS RPO process.

Source Emissions

In response to our previous request, TRC's latest protocol documents the emissions that would be used in the modeling. TRC proposes to model only SO2, NOx, and PM2.5 emissions from the facility. In visibility modeling Region 8 has required sources to provide more detailed speciation of particulates and condensable particulate emissions in Calpuff BART applicability modeling. This should include primary SO4, SOA (organic carbon particles), elemental carbon (EC), PM fine, and PM coarse particulates as per NPS recommendations.

Reference:

Caughey, M.,et al, April 30, 2008 Ambient Gaseous Ammonia Monitoring at the Fernberg, MN Air Monitoring Site Using Passive Diffusion Monitoring. Illinois State Water Survey, University of Illinois